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REV. 5-93US DEPARTMENT OF COMMERCE
PATENT AND TRADEMARK OFFICEATTORNEYS DOCKET NUMBER
P00,1852**TRANSMITTAL LETTER TO THE UNITED STATES
DESIGNATED/ELECTED OFFICE (DO/EO/US)
CONCERNING A FILING UNDER 35 U.S.C. 371**

U.S. APPLICATION NO. (if known, see 37 CFR 1.5)

09/700287INTERNATIONAL APPLICATION NO.
PCT/EP99/03048INTERNATIONAL FILING DATE
4 May 1999PRIORITY DATE CLAIMED
12 May 1998

TITLE OF INVENTION

"METHOD FOR SIGNALING IN A SIGNALING TRANSFER POINT"APPLICANT(S) FOR DO/EO/US
Klaus GRADISCHNIG

Applicant herewith submits to the United States Designated/Elected Office (DO/EO/US) the following items and other information:

1. ☒ This is a **FIRST** submission of items concerning a filing under 35 U.S.C. 371.
 2. ☐ This is a **SECOND** or **SUBSEQUENT** submission of items concerning a filing under 35 U.S.C. 371.
 3. ☒ This express request to begin national examination procedures (35 U.S.C. 371(f)) at any time rather than delay.
 4. ☒ A proper Demand for International Preliminary Examination was made by the 19th month from the earliest claimed priority date.
 5. ☒ A copy of International Application as filed (35 U.S.C. 371(c)(2))
 - a. ☒ is transmitted herewith (required only if not transmitted by the International Bureau).
 - b. ☐ has been transmitted by the International Bureau.
 - c. ☐ is not required, as the application was filed in the United States Receiving Office (RO/US)
 6. ☒ A translation of the International Application into English (35 U.S.C. 371(c)(2)).
 7. ☒ Amendments to the claims of the International Application under PCT Article 19 (35 U.S.C. §371(c)(3))
 - a. ☐ are transmitted herewith (required only if not transmitted by the International Bureau).
 - b. ☐ have been transmitted by the International Bureau.
 - c. ☐ have not been made; however, the time limit for making such amendments has NOT expired.
 - d. ☒ have not been made and will not be made.
 8. ☐ A translation of the amendments to the claims under PCT Article 19 (35 U.S.C. 371(c)(3)).
 9. ☒ An oath or declaration of the inventor(s) (35 U.S.C. 371(c)(4)).
 10. ☐ A translation of the annexes to the International Preliminary Examination Report under PCT Article 36 (35 U.S.C. 371(c)(5)).
- Items 11. to 16. below concern other document(s) or information included:**
11. ☐ An Information Disclosure Statement under 37 C.F.R. 1.97 and 1.98; (PTO 1449, Prior Art, Search Report).
 12. ☒ An assignment document for recording. A separate cover sheet in compliance with 37 C.F.R. 3.28 and 3.31 is included.
(SEE ATTACHED ENVELOPE)
 13. ☒ A **FIRST** preliminary amendment.
☐ A **SECOND** or **SUBSEQUENT** preliminary amendment.
 14. ☐ A substitute specification.
 15. ☐ A change of power of attorney and/or address letter.
 16. ☒ Other items or information:
 - a. ☒ Submittal of Drawings
 - b. ☒ **EXPRESS MAIL #EL 655299395US, dated November 13, 2000.**

09/700287

17. ☒ The following fees are submitted:**BASIC NATIONAL FEE (37 C.F.R. 1.492(a)(1)-(5):**

Search Report has been prepared by the EPO or JPO \$860.00

International preliminary examination fee paid to USPTO (37 C.F.R. 1.482) .. \$700.00

No international preliminary examination fee paid to USPTO (37 C.F.R. 1.482) but
international search fee paid to USPTO (37 C.F.R. 1.445(a)(2)) \$770.00Neither international preliminary examination fee (37 C.F.R. 1.482) nor international
search fee (37 C.F.R. 1.445(a)(2)) paid to USPTO \$1040.00International preliminary examination fee paid to USPTO (37 C.F.R. 1.482) and all
claims satisfied provisions of PCT Article 33(2)-(4) \$ 96.00**ENTER APPROPRIATE BASIC FEE AMOUNT =**

CALCULATIONS

PTO USE ONLY

\$ 860.00

Surcharge of \$130.00 for furnishing the oath or declaration later than ☐ 20 ☐ 30 months
from the earliest claimed priority date (37 C.F.R. 1.492(e)).

\$

Claims

Number Filed

Number
Extra

Rate

Total Claims

9 - 20 =

X \$ 18.00

\$.00

Independent Claims

2 - 3 =

X \$ 80.00

\$.00

Multiple Dependent Claims

\$270.00 +

\$

TOTAL OF ABOVE CALCULATIONS =

\$ 860.00

Reduction by 1/2 for filing by small entity, if applicable. Verified Small Entity statement must
also be filed. (Note 37 C.F.R. 1.9, 1.27, 1.28)

\$

SUBTOTAL =

\$ 860.00

Processing fee of \$130.00 for furnishing the English translation later than ☐ 20 ☐ 30 months
from the earliest claimed priority date (37 CFR 1.492(f)).

\$

TOTAL NATIONAL FEE =

\$ 860.00

Fee for recording the enclosed assignment (37 C.F.R. 1.21(h). The assignment must be
accompanied by an appropriate cover sheet (37 C.F.R. 3.28, 3.31). \$40.00 per property

+

TOTAL FEES ENCLOSED =

\$ 860.00

Amount to be
refunded

\$

charged

\$

a. ☒ A check in the amount of \$ 860.00 to cover the above fees is enclosed.b. ☐ Please charge my Deposit Account No. _____ in the amount of \$ _____ to cover the above fees. A
duplicate copy of this sheet is enclosed.c. ☒ The Commissioner is hereby authorized to charge any additional fees which may be required, or credit any
overpayment to Deposit Account No. **501519**. A duplicate copy of this sheet is enclosed.NOTE: Where an appropriate time limit under 37 C.F.R. 1.494 or 1.495 has not been met, a petition to revive (37 C.F.R. 1.137(a) or (b)) must be
filed and granted to restore the application to pending status.

SEND ALL CORRESPONDENCE TO:

Schiff Hardin & Waite
Patent Department
6600 Sears Tower
Chicago, Illinois 60606

SIGNATURE

Steven H. Noll

NAME

28,982

Registration Number

after the title, insert --

BACKGROUND OF THE INVENTION

Field of the Invention

This invention relates to a signaling system 7 and more particularly to a method for detecting and correcting the existing routing loops and the possibility of their presence.--;

after line 1, insert --

Description of the Related Art--;

in line 2, delete "It" and insert --Routing loops-- and delete "according to" and insert --that are based on--;

in line 3, delete "that routing loops occur in the network";

in line 4, change "errors, so that messages are" to --errors. This results in messages being--;

in line 5, before "loops" insert --detection and elimination of--;

in lines 7 and 8, delete "and, in particular, how such loops can be eliminated when they are recognized";

in lines 9 and 10, delete "thus represents" and change "network since" to --network occurs. Since--;

in line 11, change "use" to --consume-- and change "in" to --of--;

in line 12, change "It should therefore be" to --Thus, loops should be detected and--;

in line 13, delete "cannot" and insert --are unlikely to--;

in line 15, delete "recognized" and insert --detected-- and change "point in" to --point when--;

in line 16, delete "that" and change "to be" to --being--;

in line 17, change "They are just as easy to correct in that" to --These are simple to correct when--;

in line 20, delete ">" and insert --of more than-- and delete "recognize"

5

in line 23, delete "is the case" and insert --happens--;

in line 28, change "said" to --this--; and

in line 29, change "operating personnel" to --operators--.

10

in line 3, delete "freedom from" and insert --the absence of--;

in line 5, change "is informed in order to undertake" to --are informed to perform--;

15

in line 7, change "checked, not" to --checked and not--;

in line 10, change "Due to" to --Moreover, due to--;

20

after line 12, insert --

in line 13, change "aforementioned" to --stated--;

25

by a method for signaling in a signaling transfer point, that includes routing signaling messages from the source signaling points in the direction of the destination signaling points and checking the presence of either a loop or the

possibility of the presence of a loop by a routing test (MRVT) and/or by a real time method. If these checks yield a positive result the signaling messages are automatically prevented from being sent to a destination that had returning test messages.--;

- 5 in lines 16 and 17, delete "with the assistance of the drawing, whereby the drawing comprises 3 Figures." and insert --based on the Figures 1 through 3.--;
 after line 17, insert --

BRIEF DESCRIPTION OF THE DRAWINGS--;

- delete lines 18 and 19, and insert -
10 Figure 1 shows an exemplary occurrence of a loop in a signaling network.
 Figure 2 shows an exemplary method for upstream parting of a loop.
 Figure 3 shows an exemplary method for downstream parting of a loop.--;
 after line 19, insert --

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS--;

- 15 in line 21, delete ">" and insert --of more than--;
 in lines 23 and 24, delete "The time elapsing before the operating personal takes action can thus be bridged" and insert --Accordingly, the operators can promptly take corrective measures--;
 delete line 25, and insert --Furthermore, it is noteworthy to state that given
20 the *possible* loops--;
 in line 26, replace "recognized" with --detected-- and after "check" insert -
 -for loops--;
 in line 27, delete "before having potential recourse to" and insert --Prior to using the--; and
25 in line 30, change "Said" to --This--.

On page 3, in line 1, delete "appertaining" and insert --pertinent--;

in line 3, change "a loop" to --loop(s)--;
delete line 4, and insert --are thus detected. Accordingly, correction
measures can--;

in line 5, change "employed" to --selected--;

5 in line 6, change "Said" to --This-- and delete "already";

in line 7, change "realized in only one STP" to --applied in only one STP,"
and change "recognized" to --detected--;

in line 8, change "be" to --remain--;

in line 9, change "comprised in" to --based on--;

10 in line 10, change "of" to --on--;

in line 11, replace "employed" with --selected--;

in line 13, replace "recognized" with --detected--;

delete line 17, and insert --applied when other paths proceeding from A to
X are also available. Accordingly,--;

15 in line 18, change "case, it is recommendable" to --it is recommended--
and replace "employed" with --selected--;

in line 19, delete "is no" and insert --does not--;

in line 20, change "no longer contains" to --does not contain--;

in line 22, after "happens to" insert --be--;

20 in line 25, delete "thereto" and delete "respectively,";

in line 26, after "subsequently" insert --and--; and

in line 29, delete "operating personnel" and insert --operators--.

On page 4, in line 4, delete "A special characteristic" and insert --Another
aspect-- and delete "comprised in";

25 in line 5, after "breaking" insert --up--, delete "the" and insert --a-- and
delete "> 2" and insert --more than 2--;

in line 6, delete "upon utilization of" and insert --when the--, after
"features" insert --are applied-- and delete "can";

in line 7, delete "already be employed and";

in line 8, change "b)" to --(b)--;

5 in line 12, after "and" insert --also that-- and delete "also"; and
after line 13, add the following new paragraph --

Although other modifications and changes may be suggested by those
skilled in the art, it is the intention of the inventors to embody within the patent
warranted hereon all changes and modifications as reasonably and properly come
10 within the scope of their contribution to the art.--.

IN THE DRAWINGS

Please amend Figures 1, 2 and 3 to substitute English text for the German
text, as shown on the drawing copies marked in red attached to the Request for
Approval of Drawing Changes filed simultaneously herewith.

IN THE CLAIMS

On page 5, line 1, change "Patent Claims" to --I Claim:--.

Please cancel claims 1-9 without prejudice.

Please substitute claims 10-15 as follows:

2 10. A method for signaling in a signaling transfer point, comprising the
steps of:
routing signaling messages from source signaling points in a direction
4 toward destination signaling points;
checking at least one of a presence of a loop and a possibility of the

15. A method according to claim 10, further comprising the step of:

16. A method according to claim 10, further comprising the step of:

immediately after blocking a linkset in said loop.

17. A signaling system of a signaling transfer point, comprising:
a checker for detection of at least a loop or a possibility of a presence of said loop
over a departing linkset to a destination signaling point, said checker utilizes at
least one of a routing test and a real time method, wherein when a positive check
result outcome is obtained transfer of signaling messages via pertinent linksets are
automatically withheld.

18. A signaling system according to claim 17, further comprising:
a verifier for detection of said possibility of the presence of said loop, said verifier
sends test messages to destinations reachable via said departing linkset before said
signaling system withholds said transfer of signaling messages to a destination for
which said test messages return.

In line 1, change "Abstract" to --Abstract of the Disclosure--;
delete lines 2 - 7, and insert the following --

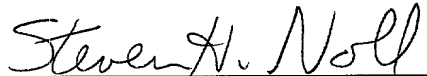
A method for detecting loops and/or the possibility of an existing loop in a signaling system 7 network by a routing test (MRVT) and/or by a real time

method. By applying the present inventive method, operators can promptly detect and eliminate the occurrence of the loops in the signaling network.--

REMARKS

The foregoing amendments to the specification and claims under Article 41 of the Patent Cooperation Treaty place the application into a form for prosecution before the U.S. Patent and Trademark Office under 35 U.S.C. §371. Accordingly, entry of these amendments before examination on the merits is hereby requested.

Respectfully submitted,



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ATTORNEY FOR APPLICANT

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METHOD FOR SIGNALLING IN A SIGNALLING TRANSFER POINT

It can occur in signalling networks according to signalling system No. 7 that routing loops occur in the network on MTP level 3 due to incorrect planning or operating errors, so that messages are routed to one or more destinations in a loop without ever reaching their destination. Of particular interest here are loops having a length greater than 2 ("length of a loop" means the plurality of signalling points participating in a loop) and, in particular, how such loops can be eliminated when they are recognized.

If loops potentially present in the tables are in fact used for routing, thus represents a serious problem for the network since messages, on the one hand, do not arrive at their destination and, on the other hand, use valuable resources in the network. It should therefore be eliminated as fast as possible.

Loops having the length 2 (so-called ping-pong loops) cannot occur given a functioning protocol in the MTP (message transfer point). Should they nonetheless arise, these loops can be easily recognized in real time in a signalling transfer point in that a check is carried out to see whether a message is to be routed over the same linkset on which it was received. They are just as easy to correct in that the unsuccessful protocol actions (sending transfer prohibited -- TFP -- messages to the cooperating party) are repeated.

Loops having a length >2 are more difficult to recognize. A check can in fact be performed with every message in a specific STP as to whether this message derives from precisely this STP (by comparing the OPC contained in the message to the PointCode of the STP). When this is the case, there is a loop in the network. STPs, however, do not necessarily generate messages or, respectively, do not necessarily generate messages to the destination or destinations to which there is a loop.

This problem can be solved by a real-time method that recognizes the possibility of a loop, for example due to a lasting overload on a linkset. When said method recognizes the possibility of a loop, the operating personnel can be informed so that corrective measures can be initiated.

The standard (Q.753, Q.754) defines another solution of the problem, what is referred to as the MTP route verification test (MRVT) that checks all possible paths in an MTP network between two given points for correctness, including freedom from loops. Upon occurrence of errors such as, for example, loops, the operating personnel is informed in order to undertake corrections. MRVT in fact has the advantage over a real-time method that it can also recognize loops before they are actually used, since all possible paths are checked, not only the current ones. The disadvantage, however, is that a separate protocol is required for it. When this is not realized in the entire network, the check is not possible or is only possible in incomplete form. This situation is specifically established in the international signalling network. Due to the load that it generates, moreover, the MRVT cannot constantly check all routes between all points in the network.

The invention is based on the object of overcoming the aforementioned disadvantages.

This object is achieved by a method according to claim 1.

The invention is explained in greater detail below with the assistance of the drawing, whereby the drawing comprises 3 Figures.

Figure 1 shows an example of a loop.

Figures 2 and 3 shows methods for parting a loop.

The present invention particularly reveals how, given real-time recognition of loops having a length > 2 and/or upon recognition of loops by the MRVT, the loops can be broken by automatic, real-time, protocol-compatible methods that are simple to realize. The time elapsing before the operating personal takes action can thus be bridged.

It must thereby be mentioned that it is advantageous, given *possible* loops that were recognized by the MRVT or a real-time method for a linkset, to check before having potential recourse to automatic correction measures (the MRVT, namely, does not supply any statements whether a possible loop is also being employed at the time and, under certain circumstances, the real-time method cannot make any statements about the destination to which a possible loop is present). Said check ensues by sending otherwise unemployed MTP network management messages

to the destinations that can be reached (according to the routing) via the appertaining linkset. When such test messages return to the STP, these messages are detected by comparing the OPC contained in the message to the point code of the STP, and a loop or, respectively, several loops are recognized. Correction measures can thereby remain limited to loops being currently employed.

Said check with the assistance of test messages is already useful when it is realized in only one STP since all loops that run through this STP can be recognized. The check method can also always be active.

Another possibility is comprised in making the initiation of correction measures dependent of the evaluation of the (relative) probability that the possible loop could be employed. These information can be made available by the MRVT in the form of priorities of the individual paths constituting the loop.

When a loop to a destination X is recognized in an STP A by the MRVT or by real-time methods, one can proceed in the following way for breaking the loop:

- a) Breaking the loop "downstream" in that the specific departing path to this destination is blocked in the routing table in A. This step can, in particular, be implemented when other paths to X are also available proceeding from A. In this case, it is recommendable to also check the route employed as an alternative for the occurrence of a loop. Although the lack of a detection of a loop is no guarantee that there is not some other loop that no longer contains A, there is at least a probability that the problem has been eliminated.
- b) Alternatively, or if, for example, there no longer happens to an alternate (loop-free) route proceeding from A, the loop can be broken "upstream", i.e. to the preceding STP B on the loop, in that A sends B a transfer prohibited message with respect to X. In response thereto, B will reroute or, respectively, stop the traffic to X. Since B will subsequently periodically review the availability of the route to X via A with what are referred to as route set messages, it must be assured that A does not answer these messages with a transfer allowed, since B could otherwise re-close the loops.

After final correction of the routing tables by the operating personnel, the actions automatically undertaken by the MTP or the operations maintenance and administration part (OMAP) can be in turn reversed by the operating personnel (Note:

OMAP comprises higher-ranking SS7 management functions, for example MRVT, screening functions and measurements. "Informing the operating personnel" is also (partially) part of the OMAP).

- 5 A special characteristic of the invention is comprised in the mechanism for breaking loops having the length > 2 with automatic measures that are simple to realize upon utilization of existing protocol features. In particular, the method can already be employed and is useful when it is realized in only a single STP.

- 10 One possibility for realizing the alternative b) is to automatically activate what is referred to as ILS/DPC screening (ILS = incoming linkset; see Q.705, §8) in A for messages from B to X. However, a linking of the ILS/DPC screening into the MTP management network is needed for this purpose such that an illegal message is answered with a TFP message and the route set test messages are also correctly handled.

Patent Claims

1. Method for the signalling in a signalling transfer point, in accord
wherewith

-- signalling messages stemming from source signalling points are routed in
the direction toward destination signalling points,

-- the presence of a loop or, respectively, the possibility of the presence of a
loop over a departing linkset to a destination signalling point (SP X) is
checked by a routing test (MRVT) and/or by a real-time method,

-- given a positive check result, signalling messages are automatically
prevented from continuing to be sent to the destination signalling point
(SP X) via the appertaining linkset.

2. Method according to claim 1, characterized in that

-- given said positive check result, test messages are first sent via a linkset to
destinations that can be reached via said linkset;

-- in the case of returning test messages, signalling messages are then
automatically prevented from being sent to a destination that had returning
test messages.

3. method according to claim 1 or 2, characterized in that signalling
messages are prevented (downstream) from being sent to the appertaining destination
via the appertaining linkset in that the specific, departing linkset to this destination is
blocked in the routing table of the signalling transfer point.

4. Method according to claim 1 or 2, characterized in that signalling
messages are prevented (upstream) from being sent to the appertaining destination via
the appertaining linkset in that the signalling transfer point (STP A) sends a transfer
prohibited message regarding the destination signalling point (SP X) to the preceding
signalling transfer point (STP B), whereupon the preceding signalling transfer point
(STP B) will reroute or, respectively, stop the traffic to the destination signalling point
(SP X).

5. Method according to one of the claims 1 through 4, characterized in that
said interruption of the loop is controlled by the operations maintenance and
administration part (OMAP).

6. Method according to one of the claims 1 through 5, characterized in that said interruption of the loop is controlled by the message transfer part (MTO).

7. Method according to one of the claims 1 through 6, characterized in that, after blocking the linkset contained in the loop, the new, current route is in turn immediately checked for freedom from loops in the signalling transfer point (STP A).

8. Signalling system of a signalling transfer point that routes signalling messages to destination signalling points, characterized in that

-- it checks the presence of a loop or, respectively, the possibility of the presence of a loop over a departing linkset to a destination signalling point (SP X) by a routing test (MRVT) and/or by a real-time method, whereby

10 -- when a positive check result is obtained, signalling messages are automatically prevented from continuing to be sent to the destination signalling point via the appertaining linkset.

9. Signalling system of a signalling transfer point according to claim 8,
15 characterized in that it verifies the detected possibility of the presence of a loop by
sending test messages to destinations reachable via said linkset before it automatically
prevents signalling messages from continuing to be sent via the appertaining linkset to
a destination for which said test messages return.

Method for Signalling in a Signalling Transfer Point

The invention shows how such loops can be recognized and eliminated as fast as possible

Figures 2 and 3

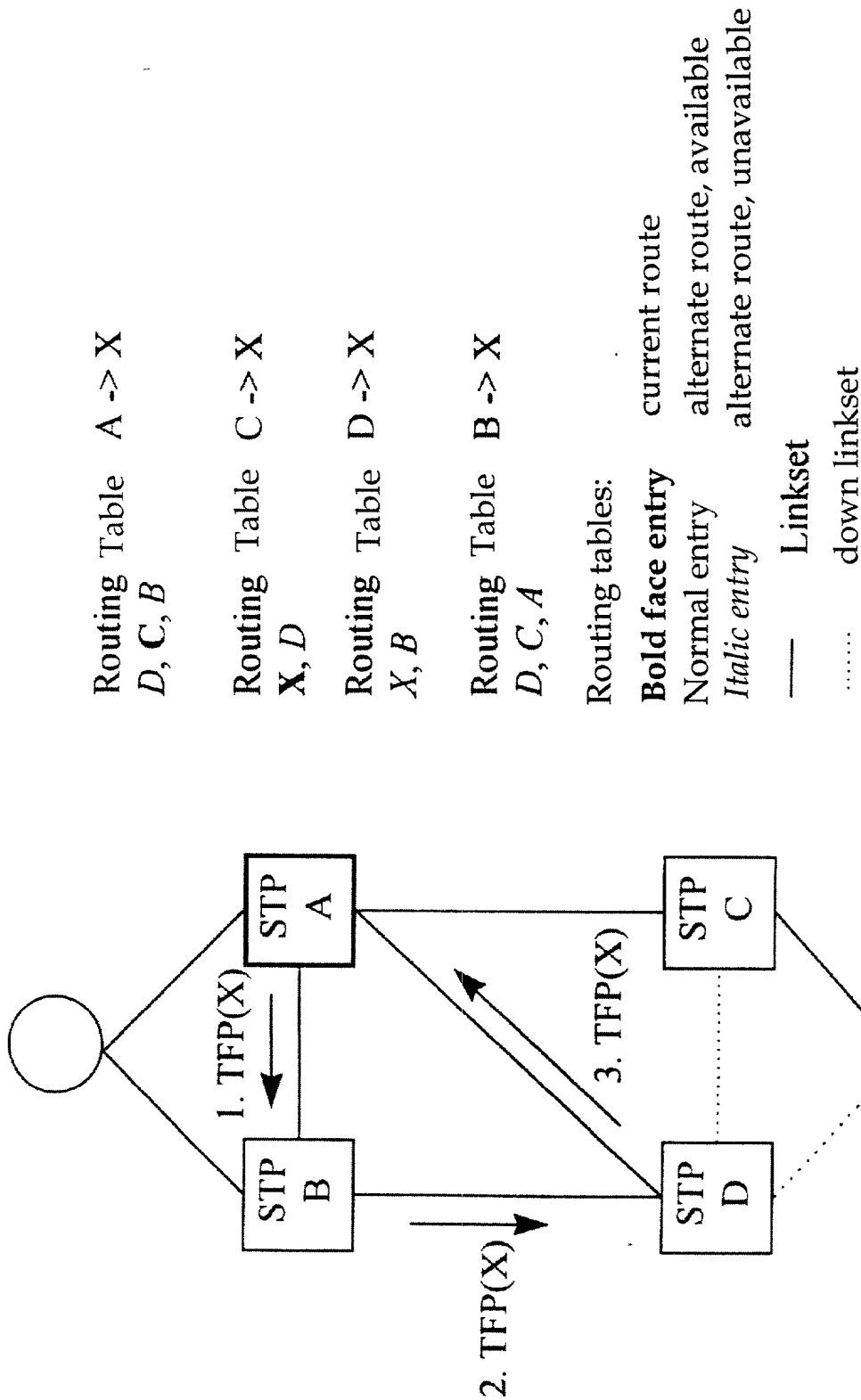
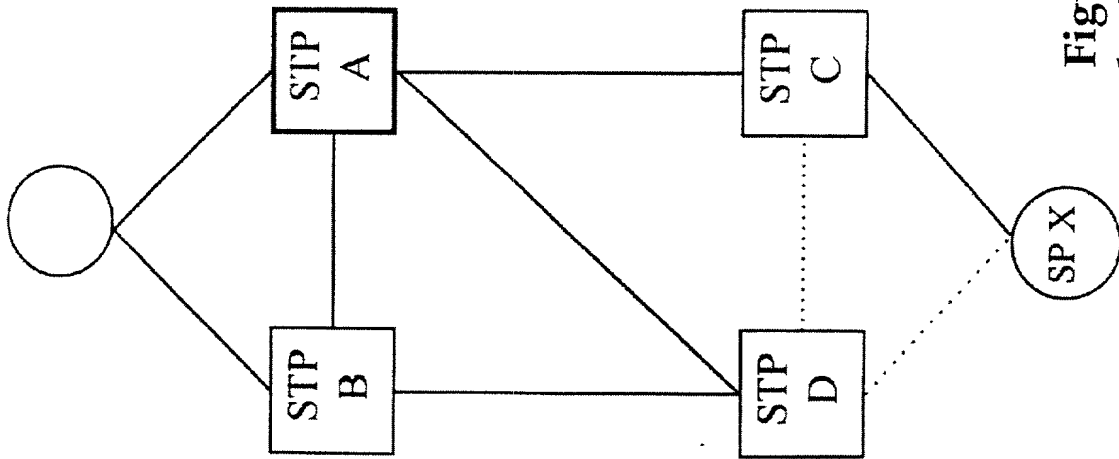


Figure 2 -- STP A parts loop "upstream"
by sending a TFP(X) to STP B
Traffic from STP B and D cannot reach SP X,
traffic is rerouted in A by resulting TFP(X)
from B to D and D to A



Routing Table A -> X (Route via D was blocked)

Routing Table C \rightarrow X
X, D

Routing Table D \rightarrow X
X, B

Routing Table B \rightarrow X
D, C, A

Routing tables:

Bold face entry	current route
1	1
2	2
3	3
4	4
5	5
6	6
7	7
8	8
9	9
10	10
11	11
12	12
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99	99
100	100

Normal entry	alternate route, available
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Italic entry
alternate route, unavailable

— Linkset
..... down linkset

Figure 3 -- STP A parts loop "downstream" by blocking the route via D
Traffic from STP B and D can continue to reach SP X

Patent and Trademark Office-U.S. DEPARTMENT OF COMMERCE

Table 1. Demographic characteristics of the study population	
Age (years)	65.0 ± 10.0
Gender	
Male	50 (50.0%)
Female	50 (50.0%)
Education (years)	12.0 ± 2.0
Marital status	
Married	40 (80.0%)
Single	10 (20.0%)
Occupation	
Retired	30 (60.0%)
Unemployed	20 (40.0%)
Income (USD/month)	1000.0 ± 500.0
Health status	
Good	30 (60.0%)
Poor	20 (40.0%)
Comorbidities	
Hypertension	15 (30.0%)
Diabetes	10 (20.0%)
Cholesterol	12 (24.0%)
Smoking status	
Smoker	10 (20.0%)
Non-smoker	40 (80.0%)
Alcohol consumption	
Regular	5 (10.0%)
Occasional	15 (30.0%)
Never	30 (60.0%)

Priority Claimed

☒ Yes
Ja

☐ No
Nein

☐ Yes
Ja

☐ No
Nein

☐ Yes
☐ No
Ja Nein

I hereby claim the benefit under Title 35, United States Code, §120 of any United States application(s) listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States application in the manner provided by the first paragraph of Title 35, United States Code, §122, I acknowledge the duty to disclose material information as defined in Title 37, Code of Federal Regulations, §1.56(a) which occurred between the filing date of the prior application and the national or PCT international filing date of this application.

(Status)
(patented, pending,
abandoned)

(Status)
(patented, pending,
abandoned)

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true, and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

090022711500


POWER OF ATTORNEY: As a named inventor, I hereby appoint the following attorney(s) and/or agent(s) to prosecute this application and transact all business in the Patent and Trademark Office connected therewith. (list name and registration number)

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